STEELHEAD VULNERABILITY TO AVIAN PREDATORS IN THE SNAKE AND COLUMBIA RIVERS

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ABSTRACT

Piscivorous waterbirds nesting along the Columbia River consume millions of juvenile salmonids (*Oncorhynchus* spp.) annually. To estimate predation rates and evaluate the relative impact of various avian colonies, we PIT-tagged, condition-scored, and released steelhead (*O. mykiss)* smolts into the lower Snake (n = 7,926 from Lower Monumental Dam) and mid-Columbia (n = 7,271 from Rock Island Dam) rivers in 2008. Caspian tern (*Hydroprogne caspia*), double-crested cormorant (*Phalacrocorax auritus*), American white pelican (*Pelecanus erythrorhynchos*), and several gull (Larus spp.*)* colonies were then scanned for PIT tags following the birds' nesting season to evaluate impacts.

Preliminary results indicate that of the PIT-tagged steelhead released into the lower Snake River in 2008, 8.7%, 2.3%, and 22.3% of the available fish (i.e., those surviving to the vicinity of the avian colonies) were estimated to be consumed by colonial waterbirds in McNary pool, John Day/The Dalles pools, and in the Columbia River estuary, respectively. Of the PIT-tagged steelhead released into the mid-Columbia River in 2008, we estimated that 3.5%, 1.9%, and 18.2% were consumed by colonial waterbirds in McNary pool, John Day/The Dalles pools, and in the Columbia River estuary, respectively. A comparison of predation between different avian species indicated that Caspian terns and double-crested cormorants nesting in the estuary consumed the largest proportion of available tagged steelhead smolt, followed by Caspian terns and double-crested cormorants nesting on islands in McNary pool. Predation by Caspian terns nesting at an off-river colony in Potholes Reservoir, WA was also notable, with an estimated predation rate of 7.5% on steelhead smolts released into the mid-Columbia River. Conversely, predation by gulls and American white pelicans was minor (ranging from 0.2% to 2.1%) in comparison to that of terns and cormorants.

Preliminary smolt condition-scoring results demonstrated that smolts exhibiting severe external damage were approximately 1.8 times more likely to be consumed by an avian predator in McNary pool, compared to undamaged smolts. In addition to condition-dependent selection, differences in smolt susceptibility to avian predators based on run-timing, stock, rear-type (hatchery, wild), and fish length were also observed. Finally, a comparison of predation rates between PIT-tagged steelhead smolts and other tagged salmonid species (Chinook, coho, and sockeye smolts) indicates that steelhead are consistently the most vulnerable salmonid to avian predation in the mid-Columbia River.